
वस्त्रादि — मोटर वाहनों के लिए बिना बुनी हुई
क्रालीन/चटाई — विशिष्टि

**Textiles — Automotive Non-Woven
Carpet/Mat — Specification**

ICS 97.150

© BIS 2022



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Technical Textiles for Mobiltech Applications Sectional Committee had been approved by the Textiles Division Council.

Automotive carpets, also known as vehicle mats, are manufactured and designed for the protection of automobile floor from wear and tear, dirt and dust, and corrosion. The automotive carpet and floor mats are gaining popularity in the market mainly due to the aesthetic look bestowed to the vehicles. One of the significant applications of the automotive carpets and the floor materials is to keep the vehicles clean and hygienic. The automotive carpets are positioned on the floor of the vehicles as well as inside the vehicle luggage area, so that the inner parts are not exposed to dust and corrosion. Most of the automotive carpets can be removed for washing and cleaning and placed back properly. These not only provides comfort and ambience but also reduce fogging and unwanted odours.

The composition of the Committee responsible for the formulation of this standard is given in Annex J.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

TEXTILES — AUTOMOTIVE NON-WOVEN CARPET/MAT — SPECIFICATION

1 SCOPE

This standard specifies requirement for automotive non-woven floor carpet/mat to be used in floor, deck surface, seat back surface, trunk side, quarter trim lower and other parts of the automobile.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions, indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 DEFINITIONS

For the purpose of this standard, the following definitions shall apply.

3.1 Automotive Nonwoven Carpet — A carpet manufactured from needle punched non-woven process, intended to be used in vehicle's floor and body which

are designed to provide protection from dirt, wear, and corrosion (*see* Fig. 1).

3.2 Needle Punched Carpets — Needle punch carpet construction is an assembly of fibre webs compacted and interlocked, using barbed felting needles so that non-woven felt fabric is obtained. An appropriate backing as per application shall be provided at the back of the carpet (*see* Fig. 2 and Fig. 3).

4 TYPES

4.1 Based on the end use of the automotive non-woven floor Carpet/mat with backing, the material shall be classified as under:

- a) *Type I* — To be used in floor;
- b) *Type II* — To be used for trim surface; and
- c) *Type III* — To be used for deck surface, seat back surface, luggage compartment, parcel tray etc.

5 REQUIREMENTS

5.1 The automotive non-woven floor carpet/mat with backing shall conform to the requirements specified in Table 1.



FIG. 1 AUTOMOTIVE NON-WOVEN CARPET

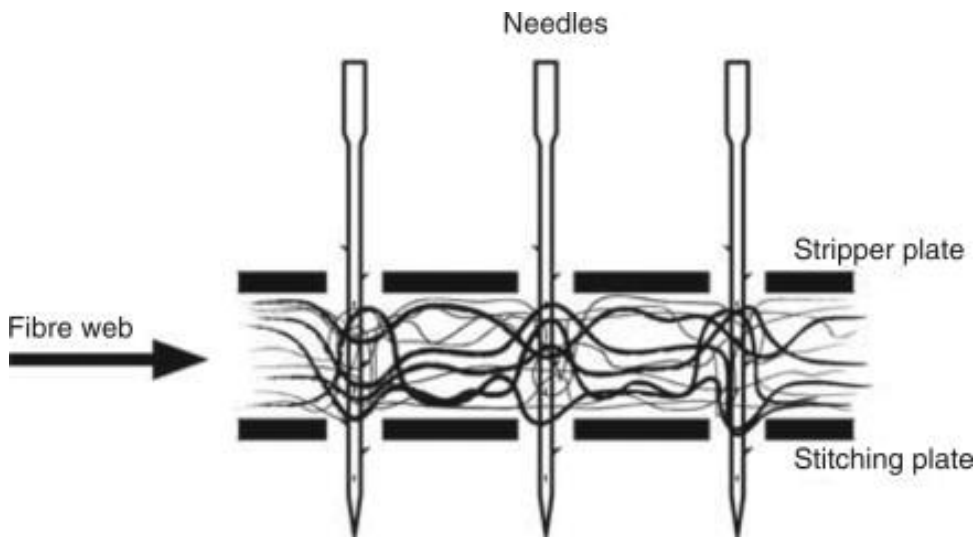


FIG. 2 NEEDLE PUNCHING



FIG. 3 NEEDLE PUNCHED CARPET

Table 1 Requirements for Automotive Non-woven Floor Carpet/Mat with Backing
(Clause 5.1)

Sl No.	Characteristics	Requirements			Method of Test, Ref to
		Type I	Type II	Type III	
		Floor carpet	Trim surface	Deck surface, seat back surface, luggage compartment, parcel tray etc.	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Length and width, m	As agreed with a tolerance of ± 1 percent.			Annex B
ii)	Mass, g/m ²	As declared with a tolerance of ± 10 percent			IS 17657
iii)	Thickness, mm (at pressure foot area of 1000 mm ²)	As declared with a tolerance of ± 10 percent			Annex C
iv)	Tensile strength, N/cm, <i>Min</i>				Annex D
	a) Length wise	← 250 →		400	
	b) Width wise	← 250 →		400	

Table 1 (Continued)

Sl No.	Characteristics	Requirements			Method of Test, Ref to
		Type I	Type II	Type III	
		Floor carpet	Trim surface	Deck surface, seat back surface, luggage compartment, parcel tray etc.	
(1)	(2)	(3)	(4)	(5)	(6)
v)	Tear strength, N, <i>Min</i> a) Length wise b) Width wise	 			IS 6489 (Part 2) (Single tear)
vi)	Wear resistance, Grade, <i>Min</i> a) Condition 1 b) Condition 2	3 3	– –	3 3	Annex E
vii)	Assessment of change in appearance after exposure to heat and humidity	Curling ≤ 2 mm	Curling ≤ 2 mm	Curling ≤ 2 mm	Annex F
viii)	Flame resistance	Shall meet any of the following conditions: 1. Test specimen shall not burn or shall stop burning before flame reaches the index line A. 2. Maximum burn rate is less than 80 mm/min 3. Burning of test piece stops before a duration of 60 s has elapsed after the flame reached the index line A and burn length of portion of test piece after that is less than 50 mm.			Annex A of IS 15061
ix)	Odour and smell test, level of acceptance, <i>Max</i> a) Dry test b) Wet test	 			Annex G
x)	Fogging test a) Method A (Photometric method), Transmittance percent, <i>Min</i> b) Method B (Gravimetric method), mg, <i>Max</i>	 			Annex H
xi)	Light fastness, grey scale rating, <i>Min</i> , exposure energy = 25 MJ/m ²				IS/ISO 105 B06, (Condition 3 of Table 3)
xii)	Dimensional change due to : a) Effect of varied water, percent, <i>Max</i> b) Heating, percent, <i>Max</i>	2 2	2 2	2 2	IS 11471
xiii)	Amount of volatile organic compound, µg/100 cm ² , <i>Max</i> a) Formaldehyde b) Acetaldehyde c) Toulene d) Xylene e) Ethyl benzene f) Styrene g) Di-n-butyl phthalate h) Tetradecane j) Di(2-ethylhexyl) phthalate k) Acrolein m) Benzene n) Total volatile organic compound	0.67 0.66 2.35 3.36 2.90 0.85 0.15 1.28 0.10 0.35 0.42 19.3	0.67 0.66 2.35 3.36 2.90 0.85 0.15 1.28 0.10 0.35 0.42 19.3	0.67 0.66 2.35 3.36 2.90 0.85 0.15 1.28 0.10 0.35 0.42 19.3	IS 17476

Table 1 (Concluded)

Sl No.	Characteristics	Requirements			Method of Test, Ref to
		<i>Type I</i>	<i>Type II</i>	<i>Type III</i>	
		<i>Floor carpet</i>	<i>Trim surface</i>	<i>Deck surface, seat back surface, luggage compartment, parcel tray etc.</i>	
(1)	(2)	(3)	(4)	(5)	(6)
xiv)	Environmental loading substances, weight percent, <i>Max</i> a) Lead b) Chromium c) Mercury d) Cadmium	← 0.1 →	← 0.1 →	← 0.1 →	Annex A of IS 15651
		← 0.1 →	← 0.1 →	← 0.1 →	
		← 0.1 →	← 0.1 →	← 0.1 →	
		← 0.01 →	← 0.01 →	← 0.01 →	
xv)	Change in appearance (Lisson tetrad test): a) Determination of mass loss b) Fibre bind	← Test A : Mass loss ≤ 1 percent →	← Test C : Better →		IS 17486
xvi)	Appearance retention assessment (Castor chair test), colour change after 25000 cycles	← 3 or better →			IS 17477

6 CONDITIONING OF TEST SPECIMENS AND SAMPLING

6.1 Prior to testing, condition the test specimens in a standard atmosphere of 27 ± 2 °C temperature and 65 ± 5 percent relative humidity for a period of 24 h (see IS 6359).

6.2 The sample shall be selected after leaving at least 500 mm from the longitudinal edge and 150 mm from the side edges.

7 MARKING

7.1 The automotive non-woven floor carpet/mat rolls shall be suitably marked with the following information:

- Manufacturer's name, initials or trade-mark;
- Type and mass in grams per square metre;
- Length and width of roll (m);
- Thickness;
- Batch No. or Lot No.; and
- Any other information as required by the buyer or the law in force.

7.2 BIS Certification Marking

The automotive non-woven floor carpet/mat conforming to the requirements of this standard may be certified

as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the automotive non-woven floor carpet/mat may be marked with the Standard Mark.

8 PACKING

The automotive non-woven floor carpet/mat shall be packed securely so as to allow normal handling and transport without tearing and exposing the contents. Details of the packing shall be as agreed to between the buyer and the seller.

9 SAMPLING

9.1 Lot

All rolls of automotive non-woven carpet/mat of same type, mass and thickness manufactured under similar conditions and delivered to a buyer against one dispatch note shall constitute a lot.

9.2 Unless otherwise agreed to between the buyer and the seller, the number of automotive non-woven carpet/mat rolls to be selected at random from a lot shall be as given in column 3 of Table 2.

Table 2 Scale of Sampling*(Clause 9.2)*

Sl No.	No. of Rolls in the Lot	Sample Size	Sub-sample Size
(1)	(2)	(3)	(4)
i)	Up to 50	3	2
ii)	51 - 150	5	3
iii)	151 - 300	8	3
iv)	301 and above	13	5

9.3 For selection of samples at random from the lot, procedure given in IS 4905 may be followed.

10 NUMBER OF TEST SPECIMENS AND CRITERIA FOR CONFORMITY

Number of test specimens and criteria for conformity shall be as given in Table 3.

Table 3 Number of Test Specimens and Criteria for Conformity*(Clause 10)*

Characteristics	Number of Samples	Criteria for Conformity
Length and width, mass, thickness, tensile strength, tear strength, and wear resistance	According to column 3 of Table 2	All the test specimens shall pass the tests
All other requirements	According to column 4 of Table 2	All the test specimens shall pass the tests

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
105-B06 : 1998	Textiles — Tests for colour fastness: Part B-06 Colour fastness and ageing to artificial light at high temperatures: Xenon arc fading lamp test	15061 : 2002	Automotive vehicles — Flammability requirements
		15651 : 2006	Textiles — Requirements for environmental labelling — Specification
1070 : 1992	Reagent grade water — Specification (<i>third revision</i>)	17476 : 2020	Resilient, textile and laminate floor coverings — Test method for volatile organic compound (VOC) emissions
4905 : 2015	Random sampling and randomization procedures (<i>first revision</i>)	17477 : 2020	Resilient, textile and laminate floor coverings – Castor chair test
6359 : 1971	Method for conditioning of textiles	17486 : 2020	Textile floor coverings — Determination of mass loss, fibre bind and stair nosing appearance change using the lisson tretrad machine
6489 (Part 2) : 2011	Textiles — Tear properties of fabrics: Part 2 Determination of tear force of trouser shaped test specimens (Single tear method) (<i>second revision</i>)	IS 17657 : 2021/ ISO 8543 : 2020	Textile floor coverings — Methods for determination of mass
11471 : 2020	Textile floor coverings and textile floor coverings in tile form — Determination of dimensional changes due to the effects of varied water and heat conditions and distortion out of plane (<i>first revision</i>)		

ANNEX B

[Table 1, SI No. (i)]

MEASUREMENT OF LENGTH AND WIDTH OF AUTOMOTIVE
NON-WOVEN CARPET/MAT ROLL**B-1 MEASUREMENT OF WIDTH****B-1.1 Apparatus**

A steel tape capable of measuring to the nearest 1 mm.

B-1.2 Conditioning

Prior to testing, condition the test specimens in a standard atmosphere of 27 ± 2 °C temperature and 65 ± 5 percent relative humidity for a period of 24 h (see IS 6359).

B-1.3 Procedure

B-1.3.1 Condition the test specimen as specified in B-1.2.

B-1.3.2 Immediately after conditioning lay the automotive non-woven carpet/mat roll on a flat surface so as to fully expose the width without distortions.

B-1.3.3 Measure the width of the specimen at three different places along its length. During measurement, measuring tape shall be placed as nearly as possible at right angle to the edge of the roll.

B-1.3.4 Calculate the average of all three readings and report the average width value.

B-2 MEASUREMENT OF LENGTH**B-2.1 Method A (By Using Roll Length Counter)****B-2.1.1 Apparatus**

Roll length counter.

B-2.1.2 Conditioning

Prior to testing, condition the test specimens in a standard atmosphere of 27 ± 2 °C temperature and 65 ± 5 percent relative humidity for a period of 24 h (see IS 6359).

B-2.1.3 Procedure

B-2.1.3.1 Mount the automotive non-woven carpet/mat roll on roll length counter and reset the counter meter to zero.

B-2.1.3.2 Now start the rolling length counter and record the reading after the complete unrolling revolutions.

B-2.1.3.3 The reading on the meter shall be the length of sample in metres.

B-2.2 Method B (By Using Length Measuring Wheel)**B-2.2.1 Apparatus**

Calibrated length measuring wheel.

B-2.2.2 Conditioning

Prior to testing, condition the test specimens in a standard atmosphere of 27 ± 2 °C temperature and 65 ± 5 percent relative humidity for a period of 24 h (see IS 6359).

B-2.2.3 Procedure

B-2.2.3.1 Lay out the automotive non-woven carpet/mat roll completely flat such that surface layer faces upwards.

B-2.2.3.2 Now reset the measuring wheel reading to zero. The reading shall be taken from the point parallel to the test specimen axis, minimum 200 mm away from the edges.

B-2.2.3.3 The measuring wheel shall be rolled over to the complete length of the roll and the reading in the measuring wheel shall be reported.

B-2.2.3.4 The value so obtained shall be the length of sample in metres.

NOTE — The length of the roll may also be measured with the measuring tape after laying it on a flat surface.

ANNEX C

[Table 1, Sl No. (iii)]

DETERMINATION OF THICKNESS OF AUTOMOTIVE NON-WOVEN CARPET/MAT ROLL

C-1 PRINCIPLE

The thickness of a specimen of automotive tufted floor covering is measured as the distance between the reference plate on which the specimen rests and a parallel circular presser foot exerting a specified pressure on an area of defined size within a larger area of the carpet/mat.

C-2 APPARATUS

C-2.1 Thickness Tester, having a circular plane presser foot area of 1 000 mm². It shall be capable of exerting pressure normal to the plane of the specimen of 2 ± 0.2 kPa and shall have a means of measuring thickness with an accuracy of 0.1 mm.

C-2.1.1 The reference plate on which the specimen rests shall be plane, of at least 125 mm × 125 mm in size and shall be parallel to the pressure foot.

C-2.2 Straightedge Ruler, for brushing the surface of the specimen.

C-3 CONDITIONING

Prior to testing, condition the test specimens in a standard atmosphere of 27 ± 2 °C temperature and 65 ± 5 percent relative humidity for a period of 24 h (see IS 6359).

C-4 PREPARATION OF TEST SPECIMEN

C-4.1 Five specimens of dimensions (75 ± 2) mm × (75 ± 2) mm (length × width) shall be taken.

C-4.2 The specimen shall be selected after leaving at least 500 mm from the longitudinal edge and 150 mm from the side edges of the roll.

C-5 PROCEDURE

C-5.1 Lay the specimen flat on the base plate.

C-5.2 After checking the free movement of circular presser foot shaft, obtain the zero reading at the contact point of circular presser foot and base plate.

C-5.3 Place the specimen on the base plate in such a way that no part of the presser foot come in contact within 20 mm of the edge of the specimen.

C-5.4 Gently lower the circular presser foot on the specimen and note the gauge reading after 30 s at a pressure of 2 kPa.

C-5.5 Repeat the procedure for rest of four specimens as stipulated in C-5.1 to C-5.4.

C-5.6 Calculate the arithmetic mean of five readings and report the thickness to the nearest 0.1 mm.

NOTE — If the automotive non-woven carpet/mat consists of more than one thickness level, the result for each thickness level shall be tested separately.

ANNEX D

[Table 1, Sl No. (iv)]

DETERMINATION OF TENSILE STRENGTH

D-1 PRINCIPLE

The test specimen is extended along its major longitudinal axis at constant speed until the specimen fractures. During this procedure the load sustained by the specimen is measured.

D-2 APPARATUS

Tensile testing machine shall be of at least 2000 N capacity with a constant speed of grip separation of 100 ± 10 mm/min. The grip width shall be at least 50 mm.

The tensile testing machine shall be equipped with suitable grips that do not allow specimen to slip from the grip.

D-3 PREPARATION OF THE SPECIMEN

The dumbbell shaped test specimens shall be prepared, 3 numbers each in longitudinal and transverse direction as shown in Fig. 4

D-4 CONDITIONING

The test specimens, prior to testing, shall be kept for at least 20 h at 27 ± 2 °C and relative humidity of 65 ± 5 percent.

D-5 PROCEDURE

Measure the width of the specimen and mark the gauge length at 60 mm. Afterwards the specimen shall be secured in the upper and lower grip of the tensile testing machine ensuring that the gauge marks coincide as accurately as possible with the edges of the grip. The grip separation speed of the tensile machine shall be 100 ± 10 mm/min. A reading shall be taken of the maximum force indicated (at break) and elongation is measured with the help of a divider or any suitable measuring device.

NOTE — The test specimens breaking outside the gauge marks shall be discarded.

D-6 CALCULATION

D-6.1 Tensile Strength (N/cm) $T = F/L$

where,

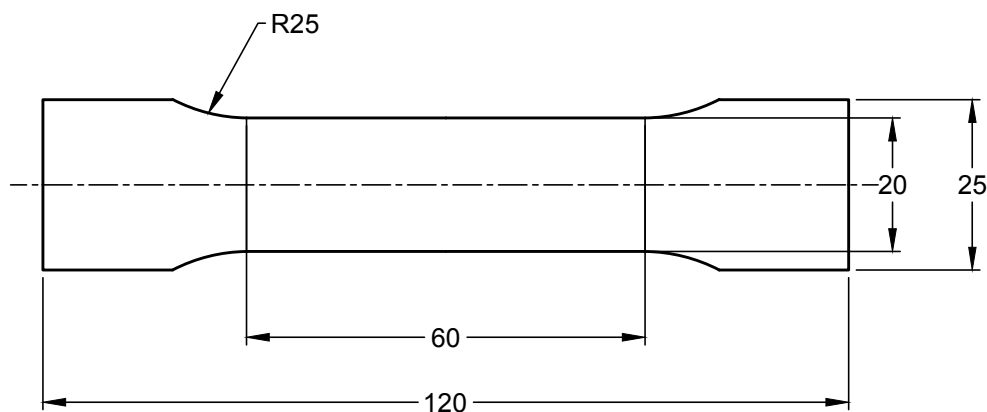
T = tensile strength, expressed in N/cm;

F = force, expressed in newton and

L = width of test specimen, expressed in cm.

D-7 EXPRESSION OF RESULT

Average value for tensile strength shall be reported.



All Dimensions in millimetres

FIG. 4 DUMBBELL SHAPED TEST SPECIMEN

ANNEX E

[Table 1, Sl No. (vi)]

DETERMINATION OF WEAR RESISTANCE OF AUTOMOTIVE
NON-WOVEN FLOOR CARPET/MAT**E-1 PREPARATION OF TEST SPECIMENS**

Take two round shaped specimen of 130 mm diameter with a concentric hole of 6 mm in the centre of the specimen.

E-2 CONDITIONING

Prior to testing, condition the test specimens in a standard atmosphere of 27 ± 2 °C temperature and 65 ± 5 percent relative humidity for a period of 24 h.

E-3 APPARATUS**E-3.1 Circular Swatch Cutter****E-3.2 Taber Type Abrasion Tester****E-4 TESTING PROCEDURE**

E-4.1 Mount the test specimen on taber type abrasion tester and subject it to the following test conditions separately:

E-4.2 Remove the test specimens and grading shall be done by analyzing the condition of the specimen as specified in **E-4.3** for each specimen.

E-4.3 Evaluate the grade of wear resistance as given below:

Evaluation Grade of Wearing Test

Class (Grade)	Criteria
5	No change is recognized
4	Slight change is recognized
3	Visible Change is recognized
2	Change is remarkable
1	Change is very remarkable

NOTE — Grade 5 is the best, and become worse as the grade number decrease.

	Abrading wheel	RevolvingSpeed (rpm)	Tread of Abrading wheel (mm)	Load (N)	Count of Revolution (times)
Condition-1	CS-10	70	57	4.9	300
Condition-2	H-18	70	57	9.8	100

NOTE — Separate test specimens shall be taken for condition 1 and condition 2.

ANNEX F

[Table 1, Sl No. (vii)]

ASSESSMENT OF CHANGE IN APPEARANCE AFTER EXPOSURE TO HEAT AND HUMIDITY

F-1 OBJECTIVE

To determine dimensional changes due to the effects of varied condition in environmental chamber.

F-2 PRINCIPLE

Operating principle is control of two parameters, that is, temperature and humidity in closed chamber.

F-3 INSTRUMENT AND APPARATUS

F-3.1 Environmental Chamber (Temperature range: 5 °C to 85 °C and relative humidity from 10 percent to 95 percent).

F-3.2 Vernier Caliper

F-3.3 Personnel Protective Equipment

F-4 CONDITIONING

Prior to testing, condition the test specimens in a standard atmosphere of $27 \pm 2^\circ\text{C}$ temperature and 65 ± 5 percent relative humidity for a period of 8 h (see IS 6359).

F-5 SAMPLE PREPARATION

Test at least 4 samples of 100×100 mm size.

F-6 PROCEDURE

F-6.1 Measure the curling of the test sample before start.

F-6.2 Place all the 4 samples backside down on the glass shelves.

F-6.3 Close the chamber door. The chamber shall not be opened while the test is running.

F-6.4 Chamber shall be set to reach 49°C and 95 percent relative humidity and sample shall be kept in this condition for 8 h.

F-6.5 In an hour, chamber conditions shall be brought to 16°C and 20 percent relative humidity and samples shall be kept in this condition for 16 h.

F-6.6 One cycle shall be completed as described above.

F-6.7 Measure all four corners of all the 4 samples for final curling. Sample shall not be lifted before measurement.

F-7 ASSESSMENT

F-7.1 Any measurements of curling greater than 2 mm in any of 4 samples is a product failure.

ANNEX G

[Table 1, Sl No. (ix)]

ODOUR AND SMELL TEST

G-1 PREAMBLE

This test shall be carried out in both dry and wet conditions to determine the odour rating of the specimens.

G-2 CONDITIONING AND NUMBER OF TEST SPECIMENS

For both the conditions, 3 specimens (total 6) each of size approximately $90 \text{ mm} \times 200 \text{ mm}$ (length $\times$ width) shall be prepared. Samples shall be conditioned at $27 \pm 2^\circ\text{C}$ temperature and 65 ± 5 percent relative humidity for a period of 24 h.

G-3 PROCEDURE

G-3.1 Dry Test

G-3.1.1 For dry test, place three specimens in three different wide mouth clean, dry and odourless jars closed with lid.

G-3.1.2 Place one empty wide mouth clean, dry and odourless jar as a reference for the test.

G-3.1.3 All jars shall be placed in oven at $65 \pm 2^\circ\text{C}$ temperature for 1 h.

G-3.1.4 Remove the jars from the oven and allow to cool to room temperature without removing the lid.

G-3.1.5 Select minimum six observers from the staff who do not work in production facilities. Observer shall not be a heavy smoker, user of strong aromatic perfumes and avoid people with sinus problems to become an observer for the test.

G-3.1.6 The first observer's nose shall be positioned about 2 to 3 cm from the jar and then the lid shall be removed.

G-3.1.7 Observer shall slowly inhale.

G-3.1.8 Record the appropriate rating (refer order rating scale as specified in **G-3.3**).

G-3.1.9 The lid shall not be off the jar longer than 5 s.

G-3.1.10 Conduct the test in an environment free from contaminant odours.

G-3.1.11 Repeat the procedure for each specimen and by all observers (total 18 ratings).

G-3.1.12 Report the highest rating.

G-3.2 Wet Test

G-3.2.1 For wet test, place three specimens in three different wide mouth clean, dry and odourless jars and add 30 ml reagent grade water (*see* IS 1070) into it. Close the jars with lid.

G-3.2.2 Place one empty wide mouth clean, dry and odourless jar as a reference for the test.

G-3.2.3 All jars shall be placed in oven at 65 ± 2 °C temperature for 1 h.

G-3.2.4 Remove the jars from the oven and allow to cool to room temperature without removing the lid.

G-3.2.5 Select minimum six observers from the staff who do not work in production facilities. Observer shall not be a heavy smoker, user of strong aromatic perfumes and avoid people with sinus problems to become an observer for the test.

G-3.2.6 The first observer's nose shall be positioned about 2 to 3 cm from the jar and then the lid shall be removed.

G-3.2.7 Observer shall slowly inhale.

G-3.2.8 Record the appropriate rating (refer order rating scale as specified in **G-3.3**).

G-3.2.9 The lid shall not be off the jar longer than 5 s.

G-3.2.10 Conduct the test in an environment free from contaminant odours.

G-3.2.11 Repeat the procedure for each specimen and by all observers (total 18 ratings).

G-3.2.12 Report the highest rating.

G-3.3 Evaluate the odour rating as given below:

Odour Rating Scale

Odour Rating	Criteria
1	No odour
2	Detectable, but not disturbing – acceptable
3	Disturbing - Not acceptable
4	Extremely disturbing-not acceptable
5	Obnoxious
6	Unbearable

ANNEX H

[Table 1, Sl No. (x)].

FOGGING TEST

H-1 PRINCIPLE

This test method is used to evaluate the fogging characteristics of automotive trim materials by two methods that is photometric method and gravimetric method.

H-2 APPARATUS

H-2.1 Fog Test Unit, a controlled heating unit with multiple chambers, with a typical temperature range from 60 °C to 130 °C. It shall be able to maintain temperature within ± 0.5 °C.

H-2.2 Dust Free Storage Chamber, with drying agent like silica.

H-2.3 Stamping Device, for preparation of samples.

H-2.4 Beakers

H-2.5 Fluoroelastic Sealing Rings, of size that matches beaker size in use, of 65 ± 5 shore A hardness.

H-2.6 Metal Rings, chrome plated steel of beaker size in use.

H-2.7 Glossmeter Head, suitable for measuring angle of incidence and reflection.

H-2.8 Spacers, of thickness 0.1 ± 0.02 mm.

H-2.9 Float Glass Plate, of thickness 3 ± 0.2 mm. The reflectance of glass shall not vary by more than ± 2 percent.

H-2.10 Magnifier, 40 X

H-2.11 Forceps

H-2.12 Aluminium Foil

H-2.13 Electronic Weighing Balance, of an accuracy of 0.1 mg.

H-3 PREPARATION OF TEST SPECIMEN

Two circular test specimens of diameter matching the size of beaker shall be taken from uniformly distributed areas of test material.

H-4 PROCEDURE**H-4.1 Photometric Method (Method A)**

H-4.1.1 Clean the sealing rings, metal rings, glass plates and beakers.

H-4.1.2 Dry the test specimens in a desiccator with silica gel without using vacuum for at least 24 h.

H-4.1.3 Place the test specimen into the beaker and cover it with the sequence of elastomer seals, glass plates, filter paper/aluminium foil and condenser that is connected to the thermostat.

NOTE — The surface of the glass plate on which the reflectance is to be measured shall face the bottom of the beaker.

H-4.1.4 Heating test temperature of 100 ± 0.5 °C shall be maintained for a period of $3 \text{ h} \pm 5 \text{ min}$. The thermostat shall maintain the coolant temperature and underside of the condenser shall have a temperature of 21 ± 0.5 °C.

H-4.1.5 After the completion of test period, remove the glass plate without touching the deposited area.

H-4.1.6 Place the glass plates horizontally in a dust free environment such that the deposited area face upwards.

H-4.1.7 The reflectance value shall be measured after a storage time of 60 ± 30 min.

H-4.1.8 Now place the glass plate on a dull black support and put a spacer on it.

H-4.1.9 Place the reflectometer on the spacer ring and take five readings.

H-4.1.10 Average of these 5 readings shall be the reflectance value.

H-4.2 Gravimetric Method (Method B)

NOTE — Disposable gloves shall be used during the test for handling of aluminium foil. Aluminium foil shall be crease free and contamination free.

H-4.2.1 Weight the aluminium foil with the electronic weighing balance and report as initial weight.

H-4.2.2 Clean the sealing rings, metal rings, glass plates and beakers.

H-4.2.3 Dry the test specimens in a desiccator with silica gel without using vacuum for at least 24 h.

H-4.2.4 Put the specimen into the glass beaker and cover it with sealing rings. Now put the aluminium foil over the sealing ring and press it with the help of rim in order to protect foil from slippage.

H-4.2.5 Clean glass discs shall be placed over the aluminium foil.

H-4.2.6 Now place the beaker in a bath at a temperature of 100 ± 0.3 °C. The thermostat shall maintain the coolant temperature and underside of the condenser shall have a temperature of 21 ± 0.5 °C. The test time shall be $18 \text{ h} \pm 0.5 \text{ h}$.

H-4.2.7 Carefully remove the aluminium foil from the sealing rings and place it in the desiccator with fogged side upwards for a drying period of 24 h.

H-4.2.8 Now weight the aluminium foil and report as after test weight.

H-4.2.9 The difference in the final weight after test of the aluminium foil (*see H-4.2.8*) and the initial weight (*see H-4.2.1*) shall be reported.

ANNEX L*(Foreword)***COMMITTEE COMPOSITION**

Technical Textiles for Mobitech Sectional Committee, TXD 38

<i>Organization</i>	<i>Representative(s)</i>
Northern India Textile Research Association, Ghaziabad	DR M. S. PARMAR (Chairman)
Arvind Limited, Ahmedabad	SHRI PABITRA SAHOO SHRIMATI MAMTA CHAUDHARY (<i>Alternate</i>)
Autoliv India Ltd, Mysore	SHRI DEEPAK RAO
BMD Pvt. Ltd, Banswara	DR NAVDEEP K. PHOGAT
Century Enka Limited, Pune	SHRI MILIND ASHTAPUTRE SHRI KRISHNAGOPAL LANDSARIA (<i>Alternate</i>)
Federation of Indian Chambers of Commerce and Industry, New Delhi	SHRI TUSHAR PATEL SHRI MAHENDRA HADA (<i>Alternate</i>)
Garware Technical Fibres Limited, Pune	DR ABHAY GUPTA SHRI JAGADANAND BEHERA (<i>Alternate</i>)
ICAR- Central Institute for Research on Cotton Technology, Mumbai	DR G. KRISHNA PRASAD DR A. ARPUTHARAJ (<i>Alternate</i>)
Indian Technical Textile Association, Mumbai	DR ANUP RAKSHIT SHRI ANKIT DESAI (<i>Alternate</i>)
Kusumgar Corporates Pvt Ltd, Mumbai	SHRI SIDDHARTH Y. KUSUMGAR DR M. K. TALUKDAR (<i>Alternate</i>)
Metro Tyres Ltd, Ludhiana	SHRI SAMIR MAYRA
Northern India Textile Research Association, Ghaziabad	SHRIMATI NEHA KAPIL SHRI DURGESH RAJ MAURYA (<i>Alternate</i>)
Office of the Textile Commissioner, Mumbai	SHRI V. K. KOHLI SHRI HUMAYUN. K. (<i>Alternate</i>)
SGS Limited, Gurugram	SHRI GAURAV SARSWAT SHRI ASHISH SARSWAT (<i>Alternate</i>)
SRF Limited, Gurugram	SHRI ANKUR SHARMA
Testtex India Laboratories Pvt Ltd, Mumbai	SHRIMATI MEETA SHINGALA SHRI DIPTI RANJAN PRUSTY (<i>Alternate</i>)
Textiles Committee, Mumbai	SHRI KARTIKAY DHANDA SHRIMATI SHILPI CHAUHAN (<i>Alternate</i>)
The Synthetic and Art Silk Mills Research Association, Mumbai	SHRI SANJAY SAINI SHRI PREMNATH SURWASE (<i>Alternate</i>)
Uniproducs Pvt Ltd, Rewari	SHRI VIKAS YADAV
VOICE, New Delhi	SHRI M. A. U. KHAN SHRI B. K. MUKHOPADHYAY (<i>Alternate</i>)
BIS Director General	SHRI A. K. BERA, SCIENTIST 'F' AND HEAD (TEXTILES) [REPRESENTING DIRECTOR GENERAL (<i>Ex-officio</i>)]

*Member Secretary*SHRI J. K. GUPTA
SCIENTIST 'E' (TEXTILES), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 2016* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: TXD 38 (16483).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402

Website: www.bis.gov.in

Regional Offices:

Telephones

Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	{ 2323 7617 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi KOLKATA 700054	{ 2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg CHANDIGARH 160019	{ 265 0206 265 0290
Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600113	{ 2254 1216, 2254 1442 2254 2519, 2254 2315
Western	: Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	{ 2832 9295, 2832 7858 2832 7891, 2832 7892

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE.
DEHRADUN. DURGAPUR. FARIDABAD. GHAZIABAD. GUWAHATI.
HYDERABAD. JAIPUR. JAMMU. JAMSHEDPUR. KOCHI. LUCKNOW.
NAGPUR. PARWANOO. PATNA. PUNE. RAIPUR. RAJKOT. VISAKHAPATNAM.

Published by BIS, New Delhi